

REMARKS

Claims 1 and 2 are amended. Support for the amendment is found in Tables 1-3, and the description of the tables at pages 34-37. No new matter is added.

In the Office Action dated December 18, 2001, claims 1 and 2 are rejected under 35 U.S.C. §103(a) as obvious over JP 07034190, JP 07097656, JP 07300653 and JP 09176786. Applicants traverse the rejection to the extent that it can be maintained.

In the December 18, 2001 Office Action, Examiner invites presentation of factual evidence with declaration to establish unexpected results not found in the prior art. A Declaration from Tadashi Kobayashi, one of the inventors, accompanies the Submission. The Declaration provides a comparison of the carbide spheroidizing ratio and the upsetting ratio for billets representative of JIS S48C standard composition (TP-1), of the prior art (TP-2) and of the invention (TP-3). The data presented in the Declaration clearly demonstrates that billets according to the present invention have an upsetting ratio greater than 90% without the occurrence of cracks and that this property is absent from the prior art billets. In particular, 10 test pieces of each billet were subject to an upsetting greater than 90% to provide the part illustrated in photographs attached to the Declaration. The results of the upsetting test clearly show that billets according to Applicants' invention are capable of upsetting greater than 90% without the occurrence of cracks while those of the prior art have an occurrence of cracks from 30% to 100%. Applicants respectfully submit that billets according to Applicants' invention having an upsetting ratio greater than 90% are not taught or suggested by the prior art.

Applicants note in paragraph 5 of the December 18, 2001 Office Action that Examiner comments with respect to "upsetting rate" implying that Applicants are claiming a product by process. Applicants respectfully point out that Applicants are claiming a billet having a particular "upsetting ratio" and not an "upsetting rate". The upsetting ratio describes a property of the claimed invention and not a process step. Applicants are not claiming a billet defined by process steps.

In view of the above, it is submitted that the application is in condition for allowance.
Reconsideration and allowance of claims 1 and 2 at an early date is solicited.

Respectfully submitted,

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Dated: 5-17-02

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims

Please amend claims 1 and 2 to read as follows:

1. (TWICE AMENDED) A billet of steel for continuous cold forging, characterized by 0.46 - 0.48 wt % of C (carbon), 0.14 or less of Si (silicon), 0.55 - 0.65 wt % of Mn (manganese), 0.015 wt % or less of P (phosphorus), 0.015 wt % or less of S (sulfur), 0.15 wt % or less of Cu (copper), 0.20 wt % or less of Ni (nickel), and 0.35 wt % or less of Cr (chromium), [such that a] wherein the billet has a limiting upsetting ratio of 90 % or more without the occurrence of cracks.

2. (TWICE AMENDED) A billet of steel for continuous cold forging, characterized by 0.46 - 0.48 wt % of C (carbon), 0.14 or less of Si (silicon), 0.55 - 0.65 wt % of Mn (manganese), 0.015 wt % or less of P (phosphorus), 0.015 wt % or less of S (sulfur), 0.15 wt % or less of Cu (copper), 0.20 wt % or less of Ni (nickel), and 0.35 wt % or less of Cr (chromium), such that a carbide of the billet has an aspect ratio of 300 % or less and the billet has a limiting upsetting ratio of 90 % or more without the occurrence of cracks.

S/N 09/575,348

PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	ANDO ET AL.	Examiner:	S. IP
Serial No.:	09/575,348	Group Art Unit:	1742
Filed:	05/19/2000	Docket No.:	12052.33US01
Title:	BILLET FOR COLD FORGING, METHOD OF MANUFACTURING BILLET FOR COLD FORGING, METHOD OF CONTINUOUSLY COLD FORGING BILLET, METHOD OF COLD FORGING CRANKSHAFT, METHOD OF COLD FORGING DISK SHAPED PART WITH SHAFT, AND COLD FORGING DIE APPARATUS		

DECLARATION OF TADASHI KOBAYASHI

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

1. I am one of the inventors of the invention described and claimed in the above identified patent application, U.S. Ser. No. 09/575,348. I have a master's degree in materials science and engineering granted by the Graduate School of Science and Engineering, Waseda University, 1990. I am employed by Honda Giken Kogyo Kabushiki Kaisha. I have been engaged in research on forging technology, and currently am in the Engineering Department of Intellectual Property Division of Honda.

2. I am familiar with the Office Action of December 18, 2001 in this application and the references cited therein. In particular, I am aware of statements in the Office Action relating to the upsetting ratio of billets having the claimed composition as well as the carbide aspect ratio of those billets. Examiner asserts that factual evidence is required to substantiate that these properties of the claimed composition are unexpected as compared to the references.

3. Three test pieces (TP) were prepared having the compositions described in Table I. TP-1 has a composition within the range of JIS S48C standard composition (fully described at page 2 line 16 of the application). TP-2 has a comparative composition. TP-3 has a composition of the claimed invention.

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4. The spheroidizing ratio was determined by a method using a scanning electron microscope (SEM) with computer image processing to calculate spheroidizing ratio. Table 2 demonstrates that the test piece (TP-3) according to the invention has a carbide aspect ratio less than 300. TP-1 (JIS S48C standard composition) and TP-2 (comparative composition) have carbide spheroidizing ratios significantly greater than TP-3.

5. An upsetting test was performed on each test piece. A counterweight for a crankshaft was prepared and the step portion of the counterweight was subject to an upsetting ratio of 90% or greater. The attached photographs illustrate the results of the test. TP-1 had a crack occurrence of 30%. TP-2 had a crack occurrence of 100%. TP-3 had no cracks occur from the upsetting test.

6. The tests performed clearly show that billets for cold forging according to the claimed invention are capable of upsetting to 90% or greater without cracking. Neither TP-1 nor TP-2 have this capability. This property is an unexpected and surprising improvement over prior art billets cited in the Office Action of December 18, 2001.

7. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

May, 15 2002

Tadaaki Kobayashi

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PATENT TRADEMARK OFFICE

TABLE 1
COMPOSITION OF TEST PIECES

wt. %	TP-1	TP-2	TP-3
C	0.5	0.48	0.48
Si	0.18	0.09	0.07
Mn	0.67	0.3	0.6
P	0.018	0.012	0.012
S	0.017	0.003	0.013
Cu	0.09	0.09	0.02
Ni	0.04	0.16	0.03
Cr	0.16	0.07	0.12

0.46-0.48
 ≤ 0.14
 ≤ 0.015
 ≤ 0.015
 ≤ 0.15
 ≤ 0.2
 ≤ 0.35

TABLE 2
MEASUREMENT OF SPHERODIZING RATIO

	Hardness (HRB)	Number per unit area (/ m ²)	Mean Carbide of Particle Diameter (m)	Mean Aspect ratio (%)
TP-1	76.7	0.2141	1.120	350
TP-2	69.4	0.1862	1.084	506
TP-3	76.3	0.2780	0.913	282

not consistent with P:10 spec
 & ratios & hardness

not consistent

? notes
 1 metre = 3.28 ft

TP1

2

HAC48 - MSA1 (組11)

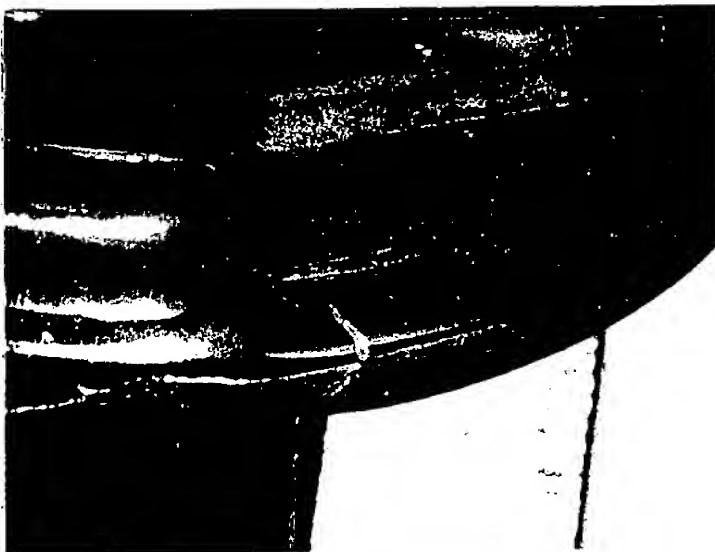
Appearance

素材
外観



Counterweight Step Portion

ウェイト
段差部



Crack
Occurrence

割れ発生率 3/10 = 30%

Internal Texture

内部
組織 (三三)

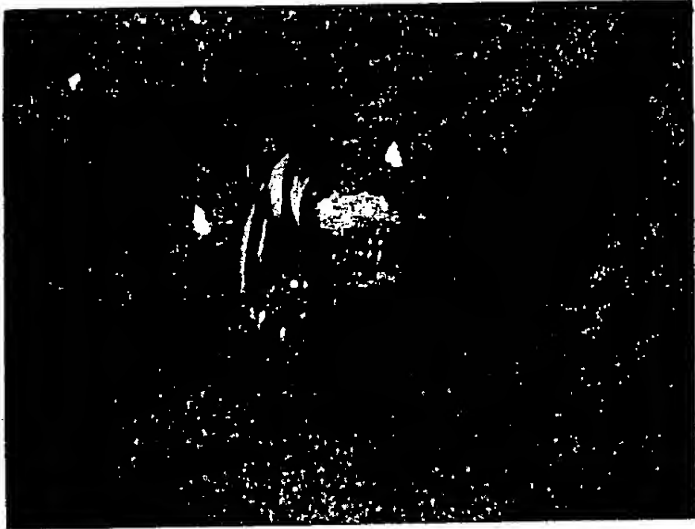

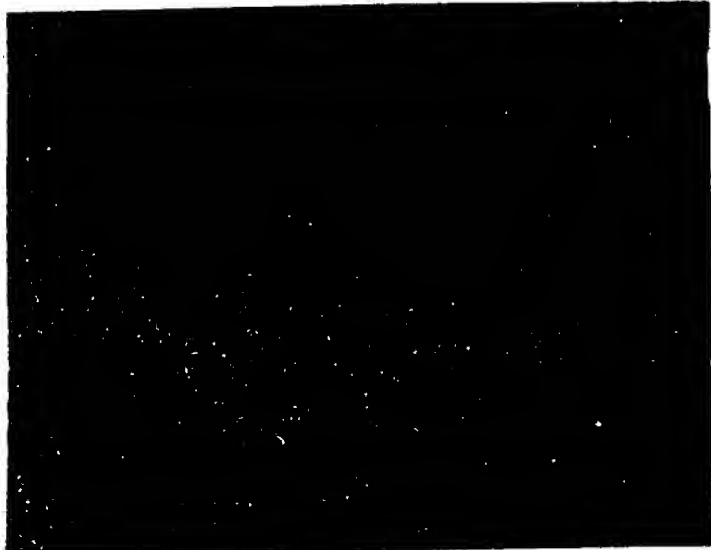


表面硬度 63.3

内部硬度 76.2

x400

TP2

5	S48CB2 (0.34m) 山陽特外鉦 - C SA
素 材 外 観 Appearance	
ウ エ イ ト 段 差 部 Counterweight Step Portion	 <p>Crack Occurrence</p> <p>音波検査率: 10% = 100%</p>
内 部 組 織 (ミクロ) Internal Texture	 <p>表面硬度: 67.4</p> <p>内部硬度: 70.2</p> <p>X400</p>

R77-7素材 (197.3.6,7 TRY エル-ト長 70 mm)

TP3

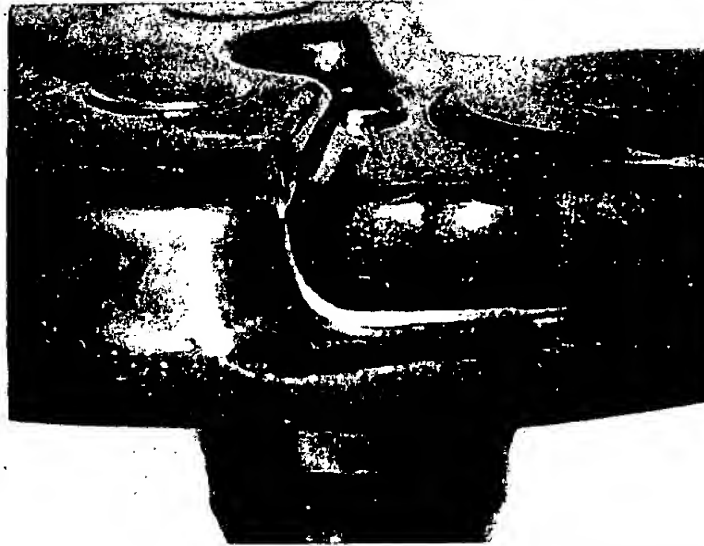
1. S48BC Z1 (0.6Nm) - MSA1 (組)

Appearance

素
材
外
觀

Counterweight Step Portion

ウ
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イ
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段
差
部



Crack Occurrence

淘汰率: $0/10 = 0\%$

Internal Texture

内部組織



表層部硬質 74.1

内部硬度: 75.2

(硬度計 EG-T)
HRB

x 400